Precalc Warm Up # 10-4

1. Find the exact value of sin 2v if $\cos v = -\frac{5}{13}$, and $\frac{\pi}{2} < v < \pi$.

HW Questions, Ch. review p. 442

(25) $\frac{\sec x - 1}{\tan x} = \tan \frac{x}{2}$

$$\frac{\sec x - 1}{\tan x} = \tan \frac{x}{2}$$

$$\frac{\frac{1}{\cos x} - \frac{\cos x}{\cos x}}{\frac{\sin x}{\cos x}} =$$

$$\frac{1 - \cos x}{\cos x} \cdot \frac{\cos x}{\sin x} =$$

$$\frac{1 - \cos x}{\sin x} =$$

$$\tan \frac{x}{2} = \tan \frac{x}{2}$$

(29) $\sin(\pi - x) = \sin x$

In Exercises 41–44, find the exact value of the trigonometric function by using the sum, difference, or half-angle formulas.

41. $\sin\frac{5\pi}{12} = \sin\left(\frac{2\pi}{3} - \frac{\pi}{4}\right)$

In Exercises 45–50, find the exact value of the trigonometric function given that

$\sin u = \frac{3}{4}$ and $\cos v = -\frac{5}{13}$ (u and v in Quadrant II).

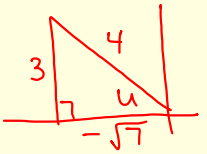
47. $\cos(u - v)$

49. $\cos\frac{u}{2} = \pm\sqrt{\frac{1+\cos u}{2}}$

$= \sqrt{\left(\frac{4}{4} - \frac{\sqrt{7}}{4}\right)\frac{1}{2}}$

$= \sqrt{\frac{4-\sqrt{7}}{8}\cdot\frac{2}{2}}$

$= \frac{\sqrt{8-2\sqrt{7}}}{4}$



since $\frac{\pi}{2} < u < \pi$

$\frac{\pi}{4} < \frac{u}{2} < \frac{\pi}{2}$

$\frac{u}{2}$ in Quad I

cosine will be +

In Exercises 51–60, find all in the interval $[0, 2\pi)$.

51. $\sin x - \tan x = 0$

$\sin x - \frac{\sin x}{\cos x} = 0$

$\sin x(1 - \sec x) = 0$

52. $\csc x - 2\cot x = 0$

$\frac{1}{\sin x} - 2\frac{\cos x}{\sin x} = 0$

$1 - 2\cos x = 0$

$x = \cos^{-1}\left(\frac{1}{2}\right)$

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

55. $\sin 2x + \sqrt{2}\sin x = 0$

$2\sin x\cos x + \sqrt{2}\sin x = 0$

$\sin x(2\cos x + \sqrt{2}) = 0$

$\sin x = 0$ $\quad 2\cos x + \sqrt{2} = 0$

56. $\cos 4x - 7\cos 2x = 8$

$\cos 4x - 7\cos 2x - 8 = 0$

$2\cos^2 2x - 7\cos 2x - 9 = 0$

$(2\cos 2x - 9)(\cos 2x + 1) = 0$

$x = \frac{\pi}{2}, \frac{3\pi}{2}$

57. $\cos^2 x + \sin x = 1$

59. $\tan^3 x - \tan^2 x + 3\tan x - 3 = 0$

$\tan^2 x(\tan x - 1) + 3(\tan x - 1) = 0$

$(\tan x - 1)(\tan^2 x + 3) = 0$

$\tan x = 1$ $\quad \tan^2 x = -3$ no sol.

In Exercises 61 and 62, write the trigonometric expression as a product.

61. $\cos 3\theta + \cos 2\theta$

HW:
Review tan WS notes and do some of the practice problems. Worked out solutions follow this slide.

Get plenty of sleep.
Have a good breakfast.
Bring your SL book tomorrow.

Extra Practice - PC book Chapter 6 (I worked out general solutions for all of them. You can use those to find on $[0, 2\pi)$.

p. 421 #3, 33, 34, 36

3) $3\tan^2 2x - 1 = 0$

$\tan^2 2x = \pm\sqrt{\frac{1}{3}}$ ★ tan on unit circle $(\frac{y}{x})$

$\tan 2x = \pm\frac{1}{\sqrt{3}}$

$2x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

for $\frac{\pi}{6}$ & $\frac{7\pi}{6}$ → $2x = \frac{\pi}{6} + \pi n$

for $\frac{5\pi}{6}$ & $\frac{11\pi}{6}$ → $2x = \frac{5\pi}{6} + \pi n$

Now ÷ by 2 for x

$x = \frac{\pi}{12} + \frac{\pi}{2}n$

$x = \frac{5\pi}{12} + \frac{\pi}{2}n$

33) $\sin 2x = -\frac{\sqrt{3}}{2}$

$2x = \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ QIII & IV

$2x = \frac{4\pi}{3}$ & $\frac{5\pi}{3}$

General for 2x:

$2x = \frac{4\pi}{3} + 2\pi n$ & $\frac{5\pi}{3} + 2\pi n$

Now ÷ by 2

$x = \frac{2\pi}{3} + \pi n$

$x = \frac{5\pi}{6} + \pi n$

34) $\tan 3x = 1$

$3x = \tan^{-1}(1)$

$3x = \frac{\pi}{4} + \frac{5\pi}{4}$

General for $3x$:

$3x = \frac{\pi}{4} + \pi n$

Now ÷ by 3:

$x = \frac{\pi}{12} + \frac{\pi}{3} n$

* tan on unit circle

$\frac{y}{x} = 1$

36) $\sec 4x = 2$

$\cos 4x = \frac{1}{2}$

$4x = \cos^{-1}\left(\frac{1}{2}\right)$

+ in QI & IV

$4x = \frac{\pi}{3} + \frac{5\pi}{3}$

General for $4x$:

$4x = \frac{\pi}{3} + 2\pi n$

$4x = \frac{5\pi}{3} + 2\pi n$

$x = \frac{\pi}{12} + \frac{\pi}{2} n$

$x = \frac{5\pi}{12} + \frac{\pi}{2} n$

p. 443 # 55, 56, 58

55) $\sin 2x + \sqrt{2} \sin x = 0$

dbl ∠ formula

$2 \sin x \cos x + \sqrt{2} \sin x = 0$ ← factor & zero product property

$\sin x (2 \cos x + \sqrt{2}) = 0$

$\sin x = 0$ $\quad \cos x = -\frac{\sqrt{2}}{2}$

$x = 0, \pi$ $\quad x = \frac{3\pi}{4}, \frac{5\pi}{4}$

56) $\cos 4x - 7\cos 2x = 8$

* think of $\cos 4x$ as $\cos[2(2x)]$

$2\cos^2 2x - 1 - 7\cos 2x - 8 = 0$

just a quadratic :) :

$2\cos^2 2x - 7\cos 2x - 9 = 0$

$(2\cos 2x - 9)(\cos 2x + 1) = 0$

Let $u = 2x$

So $\cos 4x = \cos 2u$

$\cos 4x = 2\cos^2 u - 1$

plug $2x$ back in for u

$\cos 2x = \frac{9}{2}$:(

No solution

$\cos 2x = -1$

$2x = \cos^{-1}(-1)$ ← Angle with an x-coordinate on unit circle of -1

$2x = \pi + 2\pi n$

$x = \frac{\pi}{2} + \pi n$

on $[0, 2\pi) \rightarrow$ $x = \frac{\pi}{2}, \frac{3\pi}{2}$

58) $\sin 4x - \sin 2x = 0$

* think of $\sin 4x$ as $\sin[2(2x)]$

$2\sin 2x\cos 2x - \sin 2x = 0$

factor out $\sin 2x$:

$\sin 2x(2\cos 2x - 1) = 0$

let $u = 2x \rightarrow \sin 2u$

so: $\sin 4x = \sin 2u$

$\sin 4x = 2\sin u\cos u$

Now plug $2x$ back in for u

$\sin 4x = 2\sin 2x\cos 2x$

$\sin 2x = 0$

$2x = 0, \pi, 2\pi$ ...

General

$2x = \pi n$

$x = \frac{\pi n}{2}$

$\cos 2x = \frac{1}{2}$

$2x = \frac{\pi}{3}, \frac{5\pi}{3}$

$2x = \frac{\pi}{3} + 2\pi n$ & $2x = \frac{5\pi}{3} + 2\pi n$

$x = \frac{\pi}{6} + \pi n$ $\quad$ $x = \frac{5\pi}{6} + \pi n$

p. 422 #41, 42

41) $2\tan^2 x + 7\tan x - 15 = 0$

$(2\tan x - 3)(\tan x + 5) = 0$

$\tan x = \frac{3}{2}$ $\qquad$ $\tan x = -5$

$x = \tan^{-1}\left(\frac{3}{2}\right)$ $\qquad$ $x = \tan^{-1}(-5)$

↖ tan + in QI & III $\qquad$ ↖ tan − in QII & IV

Calculate: $\qquad$ Calculate

$x \approx 0.983$ $\qquad$ $x \approx -1.373$

QI angle is ref & θ' $\qquad$ $\theta' \approx 1.373$

QIII $x = \pi + \theta'$ $\qquad$ QII $x = \pi - \theta' \approx 1.768$

$x \approx 4.124$ $\qquad$ QIV $x = 2\pi - \theta' \approx 4.910$

42) $12\cos^2 x + 5\cos x - 3 = 0$

$(4\cos x + 3)(3\cos x - 1) = 0$

$\cos x = -\frac{3}{4}$ $\qquad$ $\cos x = \frac{1}{3}$

$x = \cos^{-1}\left(-\frac{3}{4}\right)$ $\qquad$ $x = \cos^{-1}\left(\frac{1}{3}\right)$

↖ − in QII & III $\qquad$ ↖ + in QI & IV

Calculate: $\qquad$ Calculate:

$x \approx 2.419 \leftarrow$ QII $\qquad$ $x \approx 1.231$

$\theta' = \pi - x \approx 0.723$ $\qquad$ $(\text{QI} = \theta')$

QIII $= \pi + \theta' \approx 3.864$ $\qquad$ QIV $= 2\pi - \theta'$

≈ 5.052